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# What Are the Effects of the Label of an Advertised Credential and Students' STEM Growth Mindset on Their Intent to Pursue the Study of Accounting?

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## Abstract

Enrollments in accounting programs have been declining, exacerbating the shortage of professionals in the workplace, including Certified Public Accountants. Attempts to bolster accounting programs have included educating students on the roles of accountants and seeking federal recognition of accounting as part of STEM curricula. We question whether the label "Accountant" impedes students' intent to pursue accounting and whether students' STEM Growth Mindset moderates the negative effects of the Label. We surveyed non-business undergraduates to measure their STEM Growth Mindset and Intent to explore an academic program after having read one of two identical advertisements with differing Labels: Certified Public Accountant (CPA) or Certified Public Protector (CPP). A 2 (Label: CPA/CPP) x 2 (STEM Growth Mindset: High/Low) ANOVA showed only a main effect of Label on students' Intent, with the directions of the remaining effects being as expected and explained. Future research projects are suggested and implications for educators, professional organizations, the accounting profession, and the public are discussed.

**Keywords:** Accounting Enrollments, Accounting Pipeline, Certified Public Accountant, Labels, Math Anxiety, STEM Growth Mindset

> "*If names are not rectified, speech will not accord with reality; when speech does not accord with reality, things will not be successfully accomplished.*"
>
> Confucius (551 – 479 BCE), *Analects* (para. 13.3)

## Introduction

Professors of accounting have long known that students—those who are new to the discipline and those who have chosen to avoid it—harbor incorrect ideas of what accounting is. That students often incorrectly equate accounting to mathematics is a commonplace.[1] Such misperceptions interfere with students making well-informed choices about their course of study and future career. A frequent refrain of students who discard the choice of accounting is that they are not "math people" (Cohen & Hanno, 1993, p. 233; Wan et al., 2021). Such premature discarding of accounting undoubtedly is contributing to the national shortage of accountants, including licensed Certified Public Accountants (CPAs).[2]

To correct such misperceptions, and therefore to help meet the staffing and diversity needs of the accounting profession, various organizations have undertaken initiatives to help educate the lay public about the profession. Seminal efforts included The Pathways Commission (2012, pp. 21–25) issuing its groundbreaking report *Charting a National Strategy for the Next Generation of Accountants* with its "Value Proposition for a Broadly Defined Accounting Profession" and which was quickly introduced to academia in the scholarly accounting literature (Behn et al., 2012). Subsequently, the Commission (2015, p. 8) issued its Vision Model, which emphasizes accounting's critical role in creating a prosperous society and which has begun to introduce accounting to new generations of students in some accounting-principles textbooks (see, e.g., Miller-Nobles & Mattison, 2020, p. 2).

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[1] Overwhelming anecdotal evidence supports this proposition. Over the last twenty years of teaching, the corresponding author of this work has started each semester's Principles of Accounting classes by asking students what they think Accounting is. The two most common replies are invariably "math" and "keeping track of money." What is more shocking is the number of students in more advanced classes who continue to respond accordingly. Such teaching experiences appear widespread whenever the topic arises at teaching conferences and seminars. Of course, inexperienced students (and other members of the public) can be forgiven this understandable misconception. After all, a plain English parsing of "ac-count-ant" results in "to-count-performer" ("one who counts/tallies"). A misreading of the prefix "ac" comically results in "one afflicted with counting" (*Merriam-Webster's Collegiate Dictionary*, 2003, pp. 6, 8, 13, 51, and 284).

[2] Constantz (2024) reports that the United States is short 340,000 accountants and links the shortage to the recent wave in 2023 of mistakes in companies' earnings reports.

Recent efforts to educate the public better and to attract more students to the profession abound. For example, the Center for Audit Quality (2022) has taken a leading role by commissioning research for a data-driven approach to increasing diversity in the accounting profession, resulting in the Accounting+ initiative, which "serves as a resource to educate, encourage, and facilitate the adoption of accounting as a career path" (Center for Audit Quality, 2024, Our Bold Ambition) and is a collaborative effort with leading accounting firms, state CPA societies, and the public and nonprofit sector (*Accounting*+, 2024a). Similarly, the Association of International Certified Professional Accountants (AICPA, 2024b) seeks to educate and attract people to become CPAs through its *This Way to CPA* initiative. Both initiatives seek to dispel stereotypes of accounting, including that accounting does not equate to math.[3]

One final example of a recent initiative to attract talent to the accounting profession takes an opposing approach to appeal to a different audience. Accounting has been losing students to the STEM (Science, Technology, Engineering, and Math) disciplines. To counter such losses and attract such talent to reconsider accounting, efforts have been underway to seek federal recognition of Accounting as STEM[4] (NASBA, 2022; Strickland, 2023) and to have individual graduate programs designated as STEM.[5] Such efforts are aimed at attracting technical talent, both domestically and internationally.[6]

With these initiatives and efforts as a backdrop, we wondered whether the term "Accountant" in advertisements to attract students has a negative effect on their willingness to consider the study of accounting even when such advertisements educate the students about the important role that accounting plays in society and some of the key benefits of working in the profession. Furthermore, could that negative effect be moderated by students possessing a high growth mindset concerning STEM? More formally stated, "*What are*

[3] The Education page of the Accounting+ website notes, "Technology does most of the heavy lifting and typically the only math accountants use is addition, subtraction, multiplication, and division - that stuff we learned in elementary school!" (*Accounting*+, 2024b)

[4] Some proponents of including Accounting in STEM have expanded the acronym to "STEAM" (see, e.g., (Alliantgroup, 2024)), but that designation can be confusing given that proponents in other disciplines, such as the Arts, also use it (see, e.g., Huser et al., 2020).

[5] See, for example, the Master of Accounting program at the University of Michigan (Vis, 2022). The AICPA has created a tool kit to help accounting programs change their Classification of Instructional Program (CIP) code to a STEM CIP that is approved by the Department of Homeland Security (see, e.g., AICPA, 2024a).

[6] Eligible nonimmigrant students with F-1 visas with degrees from STEM-designated programs may extend their 12-month stay in the United States for their Optional Practical Training by 24 months (Department of Homeland Security, 2016). Furthermore, STEM-degree holders may enter the lottery for H1-B visas for extended stays in specialty occupations (U.S. Citizenship and Immigration Services, 2023).

*the effects of the Label*[7] *of an advertised credential and students' STEM Growth Mindset*[8] *on their Intent to pursue the study of accounting?*"

To begin to answer our question, we used a two (Label: Certified Public Accountant / Certified Public Protector) by two (STEM Growth Mindset: High/ Low) between-subjects experimental-survey design. We distributed the survey in a quasi-random manner to a convenience sample of students of a public regional university in the South. Participants began by reading one of two possible advertisements about a licensed profession, each identical except for the name of the professional designation (Label), which we manipulated. The participants then anonymously completed a survey that collected demographic data, measured their STEM Growth Mindset, and Intent to explore the advertised designation further. In this study, we did not attempt to alter mindset with a textual intervention; rather, we simply measured each participant's mindset using an established scale.

Results of a two-way between-groups analysis of variance (ANOVA) showed no statistically significant interaction between STEM Growth Mindset and Label. Similarly, no statistically significant main effect of STEM Growth Mindset was found; however, the main effect of Label was significant. Such results are explained as a likely artifact of the convenience sample of participants, which contained a disproportionately high percentage of students majoring in STEM disciplines and low percentage of students majoring in non-STEM fields. Additional analysis of the data supports this explanation.

The remaining major sections of this paper are as follows. Next, the Hypotheses Development section separately provides the basis for the expected main effects of each of the Label and STEM Growth Mindset variables and their interaction. Then, the Method section provides sub-sections concerning the advertising stimuli, measures of the variables, and the data collection procedure. The Results and Discussions section follows by

[7] Although alternative terms could include the less formal "Name," we borrow the term "Label" from the mindset literature. Just as identity labels (positive labels such as "Smart" and stereotyped labels such as "Girl") can impede students' willingness to learn (Dweck, 2016, pp. 71–79, Updated Edition), we believe that names/labels of professions can similarly impede such willingness.

[8] The term "STEM Growth Mindset" highlights that this variable is context-specific to STEM intelligence, not general intelligence. In their work on chemistry intelligence, Limeri et al. (2020, p. 4) emphasize that "responses to the mindset scale are more accurate and predictive of academic outcomes when the questions are context-specific to the course being studied (citing Shively and Ryan (2013), who demonstrated that students' views of general intelligence and math intelligence were not the same). Many researchers refer to their context-specific growth mindset variable as "Growth Mindset in X," such as Degol et al.'s (2018) "Growth Mindset in Math," which we find wordy. The more succinct "STEM Mindset," however, encompasses much more than just growth mindset (see Reid-Griffin et al. (2023), citing Murphy (2019)). We, therefore, prefer Mulvey et al.'s (2023) usage of "STEM growth mindset" (but capitalized).

presenting the cell data used in the ANOVA analysis, the ANOVA results (both tabular and graphed), and a detailed explanation for the results followed by the additional analysis. The Conclusion acknowledges the limitations of this study, suggests future research projects, and highlights implications of this work. Finally, after the References list, the Appendices provide side-by-side copies of the advertisements used in this study.

**Hypotheses Development**

This project was informed by the Theory of Planned Behavior (TPB), which posits that people's backgrounds, including media exposure, may influence their beliefs, which in turn affect their attitudes, subjective norms, and perceived behavioral control—the predicates of their intention toward a behavior—and ultimately the performance of that behavior (Ajzen, 2005, p. 135, Figure 6.3). With the TPB as a framework,[9] we suggest that media exposure, including accounting advertisements, trigger existent beliefs about what accounting is, including the prevalent misconception that accounting equates to math. That misconception in turn triggers any existent math anxiety, which reduces the intent to engage in accounting-related behavior—including pursuing a program of study in accounting.

As Luttenberger et al. (2018, p. 312) explain, "Math anxiety has been defined as feelings of apprehension and increased physiological reactivity when individuals deal with math[.]" It is comprised of a cognitive dimension ("worry") and an affective dimension ("emotionality") (Dowker et al., 2016, p. 2) and is a prevalent problem across the world. For example, "approximately 93% of adult US-Americans indicate that they experience some level of math anxiety" with an estimated 17% suffering "from high levels," and with many studies indicating negative relationships between such anxiety and math performance in primary and secondary schools (Luttenberger et al., 2018, pp. 312–314).

Luttenberger (p. 313, Figure 1) and colleagues provide a framework for understanding math anxiety. Its antecedents include environmental (e.g., culture) and personal (e.g., gender) factors. Its outcomes include performance (e.g., achievement), learning behavior (e.g., procrastination), and choices (e.g., academic and vocational). Math anxiety interacts reciprocally with other

[9] In this initial study, however, our focus is not on testing a complete model of the TPB; rather, our goal is simply to try to provide initial experimental evidence that the Label of an advertised credential, students' STEM Growth Mindset, and the interaction of Label and STEM Growth Mindset influence students' Intent to pursue the study of accounting. For an earlier study that used the TPB to examine why students choose Accounting as a major, see Cohen and Hanno (1993), which found, *inter alia*, that non-majors "believe accounting to be too *number-oriented* and boring" and that "[s]uccess in introductory courses, *skills and background in math*, and the workload in accounting courses were also . . . factors that facilitated or hindered the choice of accounting as a major" (p. 235, emphasis added).

related variables (e.g., self-efficacy and motivation). Against the backdrop of this framework, these researchers instruct institutions, teachers, parents, and learners: "Measures may aim to directly reduce math anxiety or to counteract math anxiety by strengthening an individual's positive assessments and attitudes or by supporting efficient learning" (p. 319). One such measure is to promote a growth mindset, which research has shown to mitigate math anxiety ((Boaler, 2013; Dong et al., 2023; Smith & Capuzzi, 2019).

*Main Effect of Label of an Advertised Credential*

By way of background, wording in the realm of employment, including in advertisements, has been shown to affect people's perceptions of, and intentions toward, such employment. For example, Seiter (2015) explains a specific instance in which Buffer.com, a company that helps to build brands on social media for its clients, removed the word "Hacker" from its job descriptions for developers as it was possibly discouraging women to apply for those jobs because the "Hacker" label might not be "as inclusive as other titles and could be tough for many to identify with."[10] More generally, Gaucher et al. (2011) show that gendered wording in advertisements influences people's employment decisions and thus contributes to gender inequality. In the realm of "people management professionals," Caldwell (2002) highlights the growth of the "human resource" (HR) label over the historical use of "personnel," and illustrates how name changes can influence professionals' role perceptions by concluding that such professionals "with an HR job title appear to identify more strongly with [a] change-oriented agenda" (p. 757). Similarly, a change in the name of the International Association of Hospitality Accountants (IAHA) to Hospitality Financial and Technology Professionals (HFTP) has signaled the changing role of such professionals as not just "number crunchers" and "has helped make [the] conversion from the *bean counter* and *pocket protector* stereotypes" (HFTP, 1998, p. 71)(emphasis added).

Of course, "bean counter" and "pocket protector" stereotypes are not the only accountant stereotypes, many of which are not pejorative and have existed for centuries. Indeed, Carungu and Molinari's (2022) research is illustrative, demonstrating that opposing stereotypes of accountants existed in Florentine popular culture at least as early as the early-to-mid 1300s "during the 'embryonic' development of double-entry bookkeeping" (p. 248) when merchant-bankers and merchants, as precursors to professional accountants, undertook accounting work. A thematic analysis of the popular medieval literary works demonstrated that whereas Dante Alighieri's *The Divine*

[10] After the change, Buffer.com experienced over a five-fold increase (from less than 2% to 11%) in job applicants who "identify as female" (Seiter, 2015).

*Comedy* illustrated medieval "accountants" negatively as usurers, Giovanni Boccaccio's later *The Decameron* illustrated them positively as gentlemen (p. 260)—both of which the researchers then connected to a litany of later stereotypes of accountants that appear in the accounting literature.

Carungu and Molinari (2022) performed an extensive literature review of the accountant stereotype in over 60 years of research from Robert (1957) to Leão et al. (2019). From each of 25 articles, the researchers (Table 1, pp. 250–251) classified the accountant stereotype in one of five categories and provided quotes of evidence from each work, such as excerpted as follows, with article counts in brackets: (1) Negative, (Carnegie & Napier, 2010)("dull, boring and colourless") [9]; (2) Quasi-negative, (Miley & Read, 2012)("risk averse, cautious person") [3]; (3) Mixed, (Jacobs & Evans, 2012)("necessary evil") [4]; (4) Quasi-positive, (Beard, 1994)("dysfunctional misfits") [2]; and (5) Positive, (Jacobs, 2003)("gentlemen of professional standing") [7]. The researchers then inductively identified "second-order categories or main perceptions of the accountants" (p. 251), from Negative (e.g., "Accountant as dishonest person") to Positive (e.g., "Accountant as hero"). See generally, Tables 2 and 3, pp. 252–253.

Bringing us full circle back to bean counting, Carungu and Molinari (2022, p. 244, citations omitted) offer this assessment of their literature review of accountant stereotypes:

"Overall, the accountant's primary stereotype is of someone single-mindedly preoccupied with precision and form, methodical and conservative and with a boring joyless character. This stereotype is commonly summari[z]ed with the label of "bean counter." Some authors suggested that this long-standing stereotype is disappearing. However, a considerable amount of literature suggests that it continues to be *the dominant stereotype*." [Emphasis added.]

Furthermore, recent research on the accounting pipeline by the Center for Audit Quality (2022, p. 27, Appendix, manually paginated) reported that focus group discussions touched on stereotypes: "Students talked about the negative stereotypes of accounting, in particular a lack of excitement for the field and concerns about it being math heavy." In follow-up research the next year, the CAQ's (2023) national survey of business students and recent accounting graduates confirmed that math is a prevalent concern for students in deciding not to pursue the study of accounting, finding that of thirteen non-mutually-exclusive reasons for students (n=939) not majoring in accounting, the fourth highest[11] "Major reason" (28%) was that they were "Not good

[11] The top three major reasons for not majoring in accounting were listed as follows: "Lack of interest/passion" (32%); "Higher starting salary w/ other major" (29%); and "Don't want to pursue 150 hours for CPA" (28%). Undoubtedly, some of the thirteen reported reasons likely correlate with the concern about math, such as the lack of interest/passion.

enough at math to become an accountant," which another 32 percent of students chose as being "Part of [the] reason."[12]

On balance, the label "accountant" is burdened with negative connotations and associations. In contrast, the fabricated label "protector" is not so burdened. Our first hypothesis, therefore, concerning the expected main effect of the Label of the Advertised Credential is as follows:

**H1**: Students who read an advertisement for the Certified Public Accountant (CPA) credential will tend to have less Intent to pursue the study of accounting compared to students who read the same advertisement with a different label: Certified Public Protector (CPP).

*Main Effect of STEM Growth Mindset*

In her groundbreaking work on the psychology of success, Dweck (2016) identified two mindsets[13] that affect people's willingness to learn: a fixed mindset and a growth mindset. People with a fixed mindset believe that they have a limited and unchangeable amount of personal qualities, such as intelligence, and are more concerned with maintaining their image than seeking challenges and opportunities to grow—thus limiting their success in many facets of life, including school achievement. Faced with a threat to their image, such as difficult and unfamiliar academic material, they shy away from challenges that could make them appear deficient.

People with a growth mindset, however, believe that their qualities can be developed and thus seek challenges to learn and to grow—thus improving in life, such as at school, and developing throughout life a love of learning. They are resilient and hardworking and are uncowed by the complex and the unfamiliar. Failure for them is a welcome opportunity to learn.

One perennial and increasingly critical area relevant to mindsets is mathematics education, an issue of both national and global concern. St. George (2023) reports that U.S. students' math scores on the 2022 Program of International Student Assessment (PISA) exams was at "an all-time low." The

[12] Interestingly, for students who have chosen to study accounting, Maksy and Zheng (2010, p. 338) did not find that self-perceived math abilities associate with the students' performance in advanced level undergraduate accounting courses (Advanced Accounting and Contemporary Financial Accounting Issues)—perhaps because the students "tend to over-estimate their abilities, and that *their self-perceptions of their abilities in these areas are not accurate representations of their actual abilities*." (Emphasis added.) The authors acknowledge, however, that the study was limited by its small sample size of 85 students (p. 339).

[13] After introducing the opposing mindset constructs, Dweck acknowledges that "All of us have elements of both—we're *all* a mixture of fixed and growth mindsets" (p. 47) (emphasis in the original text). As educators, we find most encouraging her conclusion that mindsets can be changed (Dweck, pp. 223–264).

United States ranked only 26th out of 81 countries in math. The good news—if it can be called that—is that because of performance declines and performance ties of other countries, the relative ranking of the United States increased from 2018's 29th place. Ultimately, fixed mindsets are a common part of the problem, including students' unwillingness to study math; interventions that promote a growth mindset are a promising part of the solution to attract students to the study of math. See, e.g., Chambers et al. (2022), Stohlmann (2022), Heyder et al. (2021), Rege et al. (2021), and Degol et al. (2018).

Students with a math fixed mindset (i.e., low math growth mindset) who hold the misconception that accounting equates to math (or that accounting is "math heavy") should express less intent to pursue an advertised program of accounting. No such difference in intent should exist for an advertised program with a fictitious name that does not identify as accounting or otherwise signal an association with math.[14] Ultimately, therefore, the combined average of intent scores across the two advertised programs should be lower for a group of math-fixed-mindset students than it is for a group of math-growth-mindset students.

Our second hypothesis, therefore, concerning the expected main effect of STEM Growth Mindset is as follows:

**H2**: Students with a High STEM Growth Mindset will tend to have more Intent to pursue the study of their advertised program than students with a Low STEM Growth Mindset.

*Moderating Effect of STEM Growth Mindset on Label (Interaction)*

As Carungu and Molinari (2022) clearly illustrate, many positive and negative stereotypes have attached to accountants and accounting over the years, but—on balance—the overall net tone of such stereotypes appears to be negative. Focusing on the intent of students with High STEM Growth Mindset to study one of two advertised programs, the average intent for the accounting program should be lower than the average intent for a fictitiously named program that does not suffer from the net negative tone of popular stereotypes. Focusing on the intent of students with Low STEM Growth Mindset, their average intent to study the accounting program should similarly be lowered by the net negative non-math stereotypes (and other non-math concerns), but it should also be further depressed by any additional marginal effect of math

[14] More generally, no such difference in average Intent should manifest between a group of students with STEM fixed mindsets and a group of students with STEM growth mindsets if the fictitious advertised program does not identify as STEM or otherwise signal an association with STEM.

anxiety (and related concerns about math, including any self-perceptions of not possessing the requisite math skill set, beliefs about math intelligence not being malleable, etc.). Furthermore, the average intent of students with a Low STEM Growth Mindset to study a fictitiously named program that does not signal any association with STEM should be the same as the average intent of students with a High STEM Growth Mindset—because the accounting stereotypes and concerns about math would not apply. Our third hypothesis concerning the expected interaction of Label of an advertised credential and STEM Growth Mindset, therefore, is as follows:

**H3**: Students with High STEM Growth Mindset will have less of a change in Intent to pursue the CPP versus the CPA program as compared to students with a Low STEM Growth Mindset, who will have more of a change in Intent to pursue the CPP versus the CPA program.

## Method

### Advertising Stimuli

We created two one-page (8.5 x 11 inches) advertising flyers asking the readers to consider a profession: Certified Public *Accountant* (CPA) or Certified Public *Protector* (CPP). We chose "Protector"[15] as the label to replace "Accountant" because it also is a three-syllable noun, but it does not elicit connections to math, does not seem burdened with negative connotations, and seems facially consistent with the professional roles proffered in the advertisement, including *inter alia* protecting the world's scarce resources from waste and abuse (e.g., by providing decision-useful information for resource-allocation decisions). Ultimately, however, our goal in this study was not to suggest to the profession what the alternative label should be; rather, our goal was simply to demonstrate experimentally that a more favorable alternative label could exist.

Except for those differing labels, the advertising flyers were identical, including advertising some key highlights of the important role of accountants in society and some valuable employment-related benefits of the profession. See Appendix A for a side-by-side comparison of the original yellow-and-blue flyers and Appendix B for the same presentation of black-and-white copies.

### Measures

All measures were adapted from the extant literature. The independent variable STEM Growth Mindset was measured using a three-item seven-point

[15] Merriam-Webster (2003, p. 999) proffers the term "Guardian" for "one that protects," which echoes the famous remarks by former SEC Chairman Arthur Levitt (1996, pp. 1–2) that "Accountants are the people who *protect* the truth. […] Accountants are the *guardians* of financial truth." (Emphasis added.)

Likert scale, which Rammstedt et al. (2022, p. 12) validated for use with adolescents and adults (see Table 1). The items in this parsimonious scale agree to three items used in Limeri et al.'s (2020, p. S2 of Supplementary Materials) four-item context-specific growth mindset scale for chemistry intelligence. (For additional discussion about context-specific growth mindset, see this paper's footnote 8.) This paper's context-specific STEM intelligence was used because it encompassed math and is consistent with the accounting profession's ongoing accounting-is-STEM efforts. The reliability of the scale was high, with a Cronbach's alpha of 0.870. Overall mean and median scores were calculated; we then split the sample at the median to allocate participants into the high and low categories.

The dependent variable Intent was measured by a three-item, seven-point Likert scale adapted from Sundar & Kalyanaraman's (2004, p. 11) scale to measure behavioral intention toward products featured in advertisements (see Table 1). The reliability of the scale was high, with a Cronbach's alpha of 0.904. An overall mean score was computed with a higher score indicating a greater intention to pursue the study of accounting.

**Table 1:** Variable Measures and Descriptive Statistics (continued on next page)

| Variable (with Cronbach's Alpha) | Survey Measure (n = 175) | Mean | S.D. |
|---|---|---|---|
| STEM Growth Mindset **α = .870**[16] | Beliefs about intelligence regarding Science, Technology, Engineering, and Math (STEM) (1 to 7, Strongly Disagree to Strongly Agree,[17] Reversed): | | |
| SGM1 | You have a certain amount of STEM intelligence and you can't really do much to change it. | 5.54 | 1.401 |
| SGM2 | Your STEM intelligence is something about you that you can't change very much. | 5.69 | 1.351 |
| SGM3 | You can learn new things, but you can't really change your basic STEM intelligence. | 5.39 | 1.397 |
| STEM Growth Mindset | Average of 3-Item Scale<br>Median = 6.0 | 5.54 | 1.232 |

[16] When item SGM3 is dropped, Cronbach's alpha increases to .929, but overall results of the ANOVA test do not materially change, except the statistical significance of the Label variable *improves* to p = .03 and its Partial Eta Squared effect size *improves* to .029. STEM Growth Mindset and its interaction with Label remain statistically insignificant—but with *improved* p-values (.34 and .31, respectively).

[17] The survey categories for Mindset were as follows: Strongly Disagree, Disagree, Somewhat Disagree, Neither Agree/Disagree, Somewhat Agree, Agree, and Strongly Agree.

**Table 1:** Variable Measures and Descriptive Statistics (continued)

| | | | |
|---|---|---|---|
| Intent **α = .904** | Referring to the program in the advertisement… (1 to 7, Very Unlikely to Very Likely[18]): | | |
| I1 | How likely are you to take a class in this program? | 3.40 | 1.725 |
| I2 | How likely are you to attend an information session about this program? | 3.52 | 1.725 |
| I3 | How likely are you to visit the associated website of this program? | 3.77 | 1.884 |
| Intent | Average of 3-Item Scale<br>Median = 3.667 | 3.56 | 1.631 |

## Data Collection

An a-priori analysis of power using G*Power 3.1 software (Faul et al., 2009) indicated that a sample size of at least 128 participants was necessary for the ANOVA test. The input parameters were as follows: Effect size f, .25 (medium);[19] α error probability, 05;[20] Power, .80;[21] Numerator degrees of freedom, 1;[22] and Number of groups, 4.[23] This study, therefore, required at least 32 participants per group. The 175 useable surveys exceeded this requirement, which resulted in a post-hoc power of .91 to find a medium effect size. See Table 2 for the descriptive statistics of the factors, levels, and cells.

To collect the data, our base of operations was the university's Student Center at a table that is regularly used for solicitation events. Over a two-day interval, we solicited participation from a convenience sample of students[24] to complete a short research instrument, offering them a participation incentive of their choice of various candies when they had finished completing the

[18] The survey categories for Intent were as follows: Very Unlikely, Unlikely, Somewhat Unlikely, Neither Unlikely/Likely, Somewhat Likely, Likely, and Very Likely.

[19] Buchner et al. ((2023, p. 27) cites Cohen (1969, p. 348) for the following conventional effect sizes: small f = 0.10; medium f = .25; and large f = .40. A cost-benefit trade-off exists when choosing an effect size. The smaller the effect size is expected to be, the larger the sample size is required to be. To avoid a prohibitively expensive study, we chose a medium effect size.

[20] The alpha level is traditional at the .05 level (Pallant, 2016, p. 210).

[21] Pallant (2016, p. 210) advises, "Ideally, you would want an 80 percent chance of detecting a relationship (if in fact one did exist)."

[22] Testing the Label x STEM Growth Mindset interaction results in 1 degree of freedom as follows: (2 Label levels – 1) x (2 STEM Growth Mindset levels – 1 ) = 1 Numerator df (see Buchner et al., 2023, p. 29).

[23] 2 Labels (CPA/CPP) x 2 STEM Growth Mindsets (High/Low) = 4 groups.

[24] Although parametric statistical techniques, including ANOVA, "assume that the scores are obtained using a random sample from the population[, t]his is often not the case in real-life research" (Pallant, 2016, p. 207).

activity. The instrument contained a short survey with an attached advertising flyer. We alternated distribution between the two flyers (CPA versus CPP) to approximate an equal number of participants across the cells of the four research conditions. We emphasized to each student that the activity was voluntary and anonymous.[25] We did not mention anything concerning accounting (including our desire to have participants who had not studied the discipline) so as not to taint any results, including by triggering demand effects. Participants were instructed to work alone at separate tables,[26] read the advertisement at their leisure, and complete a brief survey of questions, including demographic items. The bottom of the survey gave students an opportunity to request additional information about the advertised profession by requesting and completing a separate slip with their contact information, which they then confidentially deposited into a sealed ballot box. We could not track the amount of time spent by each participant, but the entire procedure typically took each participant 10 to 15 minutes.

Students completed a total of 220 surveys. However, only 175 surveys were retained after discarding surveys completed by Business and Agribusiness students (who would have already had exposure to the study of accounting) and incomplete surveys.[27] There were 96 females (54.9%) and 72 males (41.1%), with 6 participants reporting their gender as "other" (3.4%) and 1 participant indicating "prefer not to say" (0.6%). The average age of the subjects was 19.7 years (median, 19.0; range, 16–31; standard deviation, 1.86). There were 129 STEM majors (73.7%) and 46 non-STEM Majors (26.3%). Their average GPA (Grade Point Average) was 3.4 (median, 3.5; range, 1.2–4.0; standard deviation, 0.53). The total number of first-generation college students was 67 (38.3%) with 107 (61.1%) non-first-generation college students and 1 (.6%) indicating "unknown."[28]

## Results and Discussion

IBM SPSS Version 29.0.1.0 was used for data analysis. To test our hypotheses, we ran an ANOVA using the Univariate General Linear Model (GLM). See Table 2 for the Intent of Students to Pursue Accounting (by

[25] The university's Institutional Review Board for the Protection of Human Subjects in Research determined the project to be *exempt* based on federal regulations.

[26] This instruction was emphasized and enforced to ensure compliance with the "Independence of observations" assumption of all parametric statistical techniques, including ANOVA (Pallant, 2016, pp. 207–208).

[27] Three students did not respond properly to an attention-check question, so we discarded their surveys as not valid.

[28] The demographic statistics across each of the four Label/Growth-Mindset groups (cells) is substantially the same as the demographic statistics for the total sample (n = 175), providing support that the distribution of surveys was reasonably random and that uneven demographics across the groups are not driving the results.

Factors, Levels, and Cells) and Table 3 for the ANOVA Summary Table. See also Figure 1 for the Graph of Influence of Label and STEM Growth Mindset on Intent.

As Pallant (2016, p. 276) emphasizes, the possibility of an interaction effect (our H3) must be considered first because if one exists, the description of the influence of one of the independent variables will depend on the level of the other independent variable. In this study, the Label x STEM Growth Mindset interaction is *not significant* (p = .43). Hypothesis 3 is not supported. Given the lack of a significant effect, "we can safely interpret the main effects" (Pallant, p. 277).

**Table 2:** Intent of Students to Pursue the Study of Advertised Program (Factors, Levels, and Cells)

| **Label** | **Growth Mindset** | **Mean** | **Std. Deviation**[29] | **N** |
|---|---|---|---|---|
| CPA | Low | 3.13 | 1.679 | 47 |
| | High | 3.50 | 1.776 | 42 |
| | Total | 3.31 | 1.726 | 89 |
| | | | | |
| CPP | Low | 3.84 | 1.525 | 39 |
| | High | 3.82 | 1.477 | 47 |
| | Total | 3.83 | 1.490 | 86 |
| | | | | |
| Total | Low | 3.45 | 1.640 | 86 |
| | High | 3.67 | 1.624 | 89 |
| | Total | 3.56 | 1.631 | 175 |

**Table 3:** ANOVA Summary Table for Influence of Label and STEM Growth Mindset on Intent

| Source | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|
| ***Label*** | 1 | 11.27 | 4.30 | ***.04*** | ***.025*** |
| STEM Growth Mindset | 1 | 1.28 | .49 | .49 | .003 |
| Label x STEM Growth Mindset | 1 | 1.63 | .62 | .43 | .004 |
| Error | 171 | 2.62 | | | |
| Total | 174 | | | | |

The main effect of the independent variable Label is *significant* (p = .04). Hypothesis 1 is supported. The effect size as measured by Partial Eta Squared is small at .025 (greater than .01, small; and less than .06, medium) ((Pallant, 2016, p. 212 citing Cohen (1988, p. 22)). Overall, the intent of students to pursue accounting in the CPA condition (mean, 3.31; S.D., 1.726) improved for students in the CPP condition (mean, 3.83; S.D., 1.490).

The main effect of the independent variable STEM Growth Mindset is *not significant* (p = .49). Hypothesis 2 is not supported. There is not a

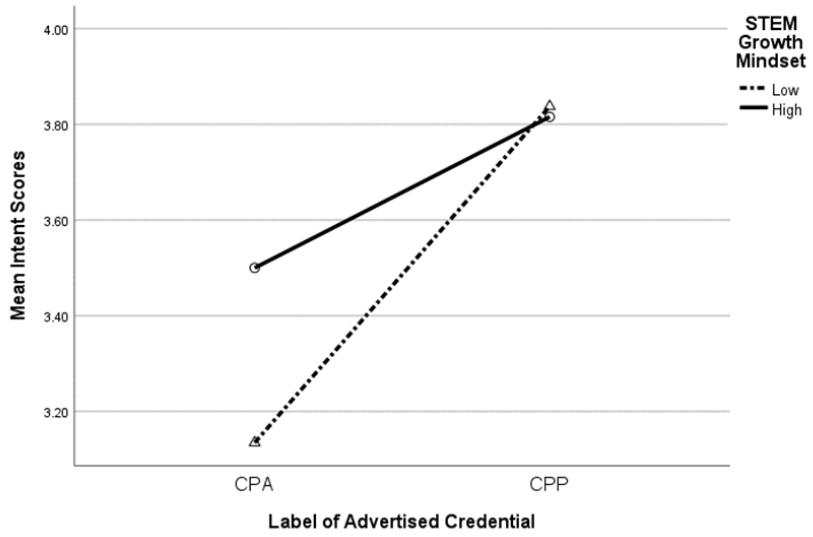
[29] The ANOVA assumption of homogeneity of variance was met. Levene's test for equality of error variances was not significant (p = .20 to .23) as required (Pallant, 2016, p. 209).

statistically significant difference in the Intent to pursue accounting for students in the Low level (mean, 3.45; S.D., 1.640) as compared to the High level (mean, 3.67; S.D., 1.624).

Figure 1 indicates that the influence of Label and STEM Growth Mindset on Intent were directionally as expected and hypothesized. First the overall average CPA Intent score (the average of the left points marked as a circle and a triangle) is lower than the overall CPP Intent score (the average of the right points marked as a circle and a triangle), indicative of a main effect of Label. The High STEM Growth Mindset line appears above the Low Growth Mindset line, which is indicative of a possible main effect of STEM Growth Mindset. Furthermore, the upward slope of the Low STEM Growth Mindset line is steeper than the slope of the High STEM Growth Mindset line, which is indicative of a possible Label x STEM Growth Mindset interaction.

Note the additional pattern in Figure 1. The High STEM Growth Mindset line is not horizontal, consistent with concerns other than math, such as negative-leaning non-math accountant stereotypes, depressing the mean Intent score in the CPA/High STEM Growth Mindset group (marked with the left circle). The additional depression of the mean Intent score in the CPA/Low STEM Growth Mindset group (marked as the distance between the left circle and the left triangle) is consistent with the extra marginal effect of math-related concerns, such as math anxiety, and self-perceptions of not possessing the requisite math skill set.

**Figure 1:** Graph of Influence of Label and STEM Growth Mindset on Intent




We suggest a plausible explanation for these incomplete findings. First, of the convenience sample of students, a distinct minority (26.3%) were

majoring in non-STEM disciplines whereas the vast majority (73.7%) had majors in STEM disciplines.[30] The proportion of STEM majors in this study is nearly four times the percentage (19.6% in 2022) that we would expect from a representative sample of university students in the United States as reported by the World Economic Forum (2023) (with the proportion of non-STEM majors being less than a third of what we would expect from a representative sample). This disproportionality toward STEM disciplines has caused the STEM Growth Mindset measures to cluster toward the high end of the 7-point scale, with the median at which the factor was split into the Low/High levels being 6.0 (Low < 6.0) (see Table 1).[31] As expected, the High level of the STEM Growth Mindset factor (89 students) contains all scores on the agreement side of the scale (mean, 6.4; S.D., 0.43; median, 6.3). The Low level (86 students), however is problematic: containing 63 (73.3%) scores that are on the agreement side (> 4.0) of the scale (mean, 4.6; S.D., 1.08; median, 5.0). The inflation of Low STEM Growth Mindset likely understates the possible main effect of Growth Mindset. A proportionate sample likely would have resulted in lines that are farther apart in Figure 1, with a steeper slope of the dashed line (and hence making a detectable interaction more likely) because lower STEM Growth Mindset (and thus higher susceptibility to math anxiety) should result in lower Intent to pursue the study of accounting in the CPA/Low group.

Another explanation for our results concerns statistical power. Although we had planned our initial sample size of 128 participants based on a medium effect size with power of .80, the actual effect size for the main effect of Label (H1) was small (Partial Eta Squared of .025, see Table 3). Our post-hoc observed power, therefore, was .54 for that effect. The post-hoc observed power for the main effect of STEM Growth Mindset (H2, Partial Eta Squared of .003) was .11 and the interaction of Label with STEM Growth Mindset (H3, Partial Eta Squared of .004) was .12. If a new study seeks a more accurate measurement of STEM Growth Mindset with a more representative sample of participants, the minimum sample size required would be at least 312 for power of .8 (512 for power of .95), if we estimate that one of the effect sizes will remain small as informed in this study (at Partial Eta Squared of .025).

[30] Common non-STEM majors were in the Arts and Education; common STEM majors included various medical disciplines (such as Biomedical Science) and Computer Science.

[31] A multiple regression with STEM Growth Mindset treated as a continuous mean-centered variable finds the same results as the ANOVA analysis, except p-values partially *improve* (Label, .038; STEM Growth Mindset, .42; and Label X STEM Growth Mindset interaction, .60).

## Additional Analysis

*ANOVA with Less Clustered STEM Growth Mindset Scores*

Given the clustering of STEM Growth Mindset scores on the high end of the scale, as explained in the prior discussion of results, we explored the effects of minimizing such clustering by re-running an ANOVA using only the most extreme (High or Low, as applicable) 32 scores in each of the four experimental groups (CPA/CPP x High/Low). This approach resulted in near conventional significance of the main effect of STEM Growth Mindset (*p = .086*; Eta Squared = .024) with minor changes in the mean Intent scores (High: M = 3.86, SD = 1.733; Low: M = 3.36, SD = 1.594). Likewise, the significance of the main effect of Label improved (p = .016; Eta Squared = .046) with minor changes in the mean Intent scores (CPA: M = 3.26, SD = 1.751; CPP: M = 3.97, SD = 1.534). Such small changes in Intent scores were not enough to cause any meaningful change in the lack of an Interaction effect (p = .43, Eta Squared = .005) because this analytic approach cannot compensate for the disproportionate lack in Low STEM Mindset scores in the data set.

*Students' Requests for More Information*

As noted in the Data Collection section, at the bottom of each survey participants were asked, "Are you interested in pursuing more information about classes in this advertised program?" If they responded "Yes," they asked for a separate request slip, confidentially completed it, and then deposited it in a sealed ballot box. The purpose of this activity was to determine whether students' Intent would correlate with this low-cost activity of requesting information. The results from the 175 students for this variable "Information" were as follows: No, 91 (52.0%); Yes, 9 (5.1%); and Undecided, 75 (42.9%). After the data collection was finished, we contacted the nine students thanking them for their participation and informing them of the fictional nature of the study. We attribute the low number of request slips to the fact that the students had already committed to an academic major and were at lunch in a busy food court of the student center and were rushing between classes. Ultimately, however, the Spearman's rho correlation[32] of Information with Intent was .64[33] and was *highly significant (p < .001)*. In sum, the greater the students' average score on the 3-item scale of Intent, the more likely they were not to say "No" to the Information question.

[32] All correlations are two-tailed tests unless otherwise noted.

[33] This correlation is consistent with the intention-behavior gap commonly found in research on the Theory of Planned Behavior. Ajzen (2005, p. 100) reports meta-analyses that have shown intention-behavior correlations ranging from .44 to .62. Brigham and Ziebart (2020, pp. 366–367) report similar results between accounting professors' intentions and behaviors in the realm of the formal enforcement of their universities' academic misconduct rules.

*Other Significant Correlations*

Consistent with the ANOVA analysis, when the students' advertised program was Certified Public Protector (CPP), their Intent to pursue the program was higher (Spearman's rho, .16; p = .038). Furthermore, consistent with conventional wisdom about the difficulties faced by first generation college students as compared with other students, First Generation status was negatively correlated with Grade Point Average (Spearman's rho, -.19; p = .011). Finally, consistent with the idea that a growth mindset can result in school achievement, the higher students' STEM Growth Mindset was, the higher their Grade Point Average (one-tailed Pearson correlation, .14; p = .029). No other significant correlations were found between variables in this study.

## Conclusion

Wooldridge (2022) cautions that the shortage of accountants is a threat to capitalism and urges the accounting profession to continue to take measures to address this issue. Many of these measures are laudable, especially efforts to communicate to the public about accounting and the role of accountants in society. This study, however, supports the idea that many university students can't get past the label "Accountant" in communications, even when they concern a profession that allows them to meet the career expectations of young people: To do well by doing good in the world. While all students may be susceptible to the overall net negative effect of accountant stereotypes (and other concerns, such as the 150-hour rule for CPA licensure), students with a fixed math mindset face additional threats to their willingness to pursue the study of accounting, including the negative effect of math anxiety and similar math-related concerns (such as self-perceptions of not possessing the requisite math skill required by the accounting profession).

This study used a two (Label: CPA/ CPP) by two (STEM Growth Mindset: High/Low) between-subjects experimental-survey design to answer the following question: What are the effects of the Label of an advertised credential and students' STEM Growth Mindset on their Intent to pursue the study of accounting? Although only a main effect of Label was found (and no main effect of STEM Growth Mindset and its interaction with Label), the logic of the argument underpinning the hypotheses development is sound. The partial finding appears driven by the convenience sample of undergraduate students, the vast majority of whom had already chosen STEM fields as an academic major—resulting in students in the CPA/Low group reporting quite high levels of STEM Growth Mindset, and thus being less susceptible to math anxiety and other concerns about math (including self-perceptions of not having the necessary math skill set to pursue the study of accounting).

*Limitations*

This study, like all studies, has limitations. Primarily, the convenience sample of university students was not representative of university students across the United States. Related, the participants in this study had already disproportionately committed to a STEM major, so their reported intent to pursue the study of their advertised profession (CPA/CPP) may differ from the actual intent of students who have not yet decided on their course of study, such as high school students—a large target audience of efforts to attract students to the accounting profession. Furthermore, data was collected in the convenient high-traffic location of the students' university center (an uncontrolled environment), which could have distracted some students from giving serious consideration to the research instrument. Additionally, while a sample size of 175 students was sufficient to find various results, statistical power is an issue for not finding smaller effects.

*Future Research*

Acknowledgment of such limitations points the way to future research projects to address potential threats to validity and to make cumulative contributions to a body of research. In the case of our research on the effects of the "Accountant" label and STEM Growth Mindset on students' intent to pursue the study of accounting, future next steps include surveying a large sample of high school students who have not committed to a career and its program of study in higher education. Obtaining a reasonably representative sample of high school students should result in a better measure of Low STEM Growth Mindset, and ultimately a greater variance in Intent scores, making evident the relations hypothesized in this first study. Related, the use of online survey tools will provide opportunities to reach a wider audience in a less distracting setting while helping to control for various threats to validity, such as by measuring each participant's time on task.

Other longer-term studies could begin to answer questions that spring from this earlier work. For example, rather than just measuring STEM Growth Mindset, future studies could test the efficacy of mindset interventions. Furthermore, future work could seek to identify alternative targeted mindset interventions to appeal to various diverse groups. In the longer term, future studies could begin the work of identifying alternative labels (names) for the accounting profession that have the proper denotations and connotations. Such studies that employ experiments using advertisements could add an experimental condition that does not contain any Label to help parse the extent to which improved students' intention to study accounting is driven by the elimination of the "baggage" associated with the old Label versus the "glamour" of the new Label.

*Implications*

This study and suggested future research studies have implications for educators, professional organizations, the profession, and the public. For educators, we echo the work of Mintchik et al. (2021) envisioning "mindsets as an enhancement of 21st century accounting education." Specifically, to the extent that a context-specific Growth Mindset in STEM intelligence is found to provide significant marginal benefits in attracting certain sub-groups to the accounting profession, interventions promoting such a mindset that is persistent should be added to the educators' toolbox. For professional organizations, we applaud the ongoing accounting-pipeline efforts, including the research to provide data-driven solutions to the shortage of accountants. As part of these research efforts, organizations such as the Center for Audit Quality could help the academy in identifying which mindset interventions work best with which sub-groups of the population. To the extent that underrepresented groups can then be further attracted to the profession, the benefits of diversity should accrue to accounting employers and underserved members of the public.

Regarding labeling, it is too early to make broad pronouncements as to whether the accounting profession should change its name. If so, we leave it to the accounting profession, informed by data-driven research, to identify a suitable alternative that better encompasses the myriad and ever-increasing responsibilities of modern accounting and that is not burdened with negative associations. We, however, caution that sweeping changes can have unintended consequences to the accounting profession. For example, Sathe (2019) showed that the change to a 150-hour requirement for CPA licensure, while intended as a compromise to requiring a master's degree, has had the unintended consequence of allowing future accounting students to earn their additional credits of education through dual-credit coursework in high school, such as through Advanced Placement exams on general education courses, instead of graduate studies. Ultimately, if the accounting profession does eventually change its name, we hope that it does not detract or signal a change away from its hallowed tradition of ethics and integrity.

In the end, perhaps Confucious (E. Slingerland, Trans. 2003, 13.3) was right. When "names are not rectified, speech will not accord with reality; when speech does not accord with reality, things will not be successfully accomplished." In the context of accounting, such unaccomplished things surely include maximizing the success in attracting a larger and more diverse population of professionals to a profession that is critical to the wellbeing of our society, economic system, and the global community.

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**Data Availability**: Data is available from the corresponding author.

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**Declaration for Human Participants:** Morehead State University's Institutional Review Board approved the project as exempt research under federal regulations.

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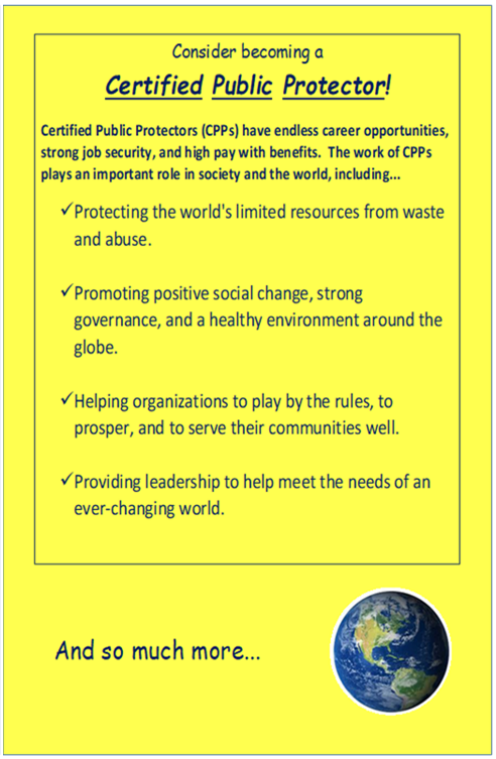
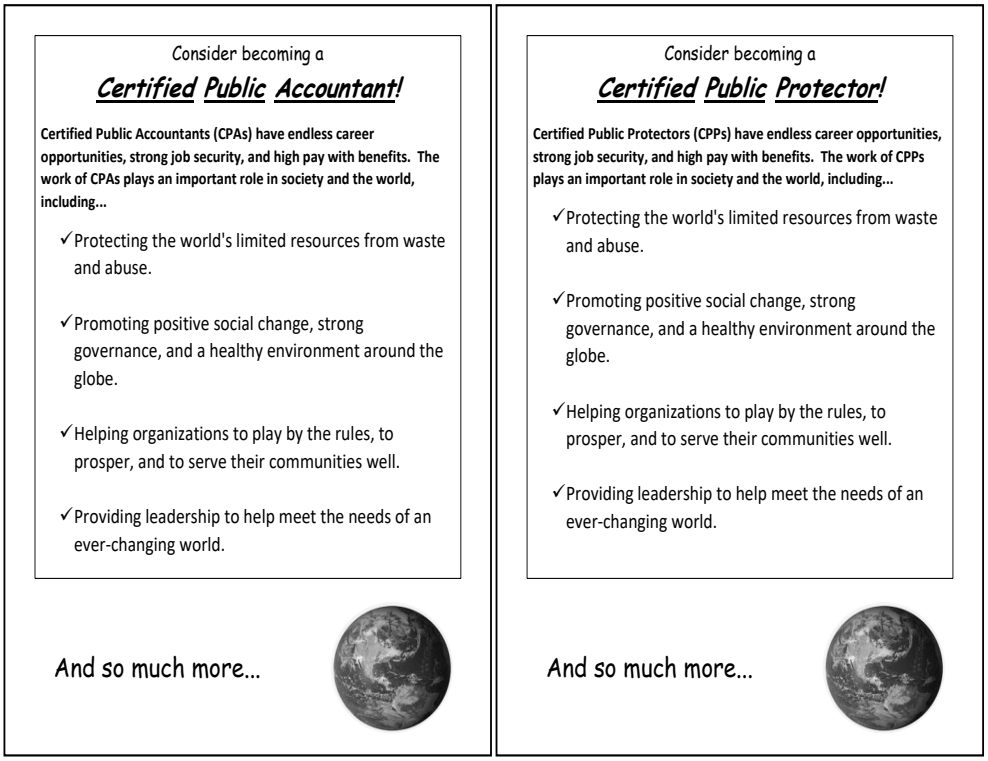
## Appendix A
## Original Advertisements in Color


**Advertisement 1: CPA**




**Advertisement 2: CPP**

## Appendix B
## Black and White Advertisements




**Advertisement 1: CPA** **Advertisement 2: CPP**